

**METHOD OF MAKING A HYBRIDE SUBSTRATE HAVING A THIN
SILICON CARBIDE MEMBRANE LAYER**

ABSTRACT OF THE DISCLOSURE

A hybrid semiconductor substrate assembly is made by first forming a
5 silicon oxide (SiO_x) layer within a silicon carbide wafer, thus forming a silicon
carbide membrane on top of the silicon oxide layer and on a surface of the
silicon carbide wafer. Optionally, the silicon oxide layer is then thermally
oxidized in the presence of steam or oxygen. A substrate-of-choice is then wafer
bonded to the silicon carbide membrane, optionally in the presence of a wetting
10 layer that is located intermediate the substrate-of-choice and the silicone carbide
membrane, the wetting layer containing silicon. The silicon oxide layer is then
removed by hydrofluoric acid etching, to thereby provide a hybrid semiconductor
substrate assembly that includes the substrate-of-choice wafer bonded to the
silicon carbide membrane. The hybrid semiconductor substrate assembly is then
15 annealed. The method is repeated a plurality of times, to thereby provide a
plurality of hybrid semiconductor substrate assemblies, each assembly including
a substrate-of-choice wafer bonded to a silicon carbide membrane. Optionally,
an annealing step may be provided after the silicon oxide layer is formed and
prior to wafer bonding.